TRANSBOUNDARY — SUMAS COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

Sumas coastal cutthroat have been identified as a distinct stock complex based on the geographic distribution of their spawning grounds. The Sumas River is part of the Fraser River (British Columbia) system, however cutthroat spawning does occur within the portion of the river which originates in Washington State.

Anadromous cutthroat in the Sumas as well as the resident form are present and are considered to be native. Both life history forms are sustained by wild production.

Spawn timing information is available only for the anadromous life history form. River entry from salt water occurs from August through October (early-entry migration timing), and spawning takes place from January through April.

STOCK STATUS

The status of the Sumas stock complex is Unknown. Biological surveys for coastal cutthroat have concentrated on geographic range and distribution rather than numerical abundance. The quality of data on locations of spawning and rearing sites of anadromous cutthroat in the Sumas River is good, but quantitative data on abundance or survival related to stock status are lacking.

In most systems the geographic range of anadromous cutthroat has been shrinking for at least the last 13 years. Reduced water quality and quantity, as well as increased instream and near-stream human-related activities are responsible for reductions in cutthroat distribution within the watershed. Although range/distribution has shrunk, the anadromous cutthroat population size may not have declined. However, given the species life history and behavior when forced to interact with other salmonids, it is more likely that reduced distribution equates to reduced numbers.

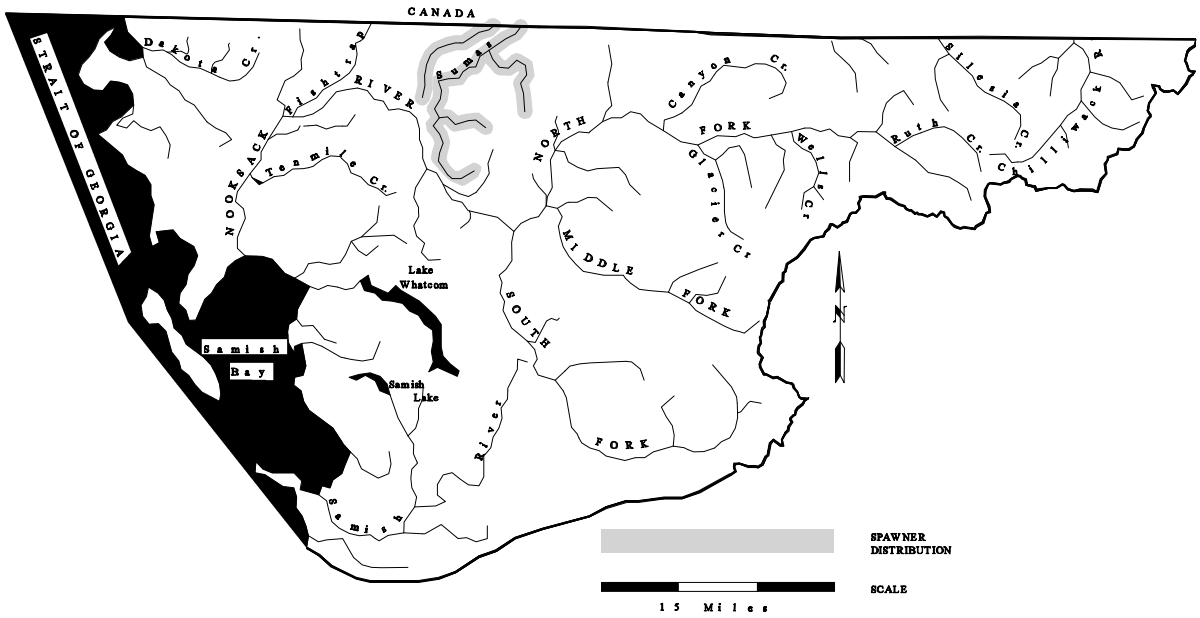
FACTORS AFFECTING PRODUCTION

Habitat--Livestock grazing and agricultural practices that remove streamside vegetation and increase siltation limit spawning areas and production. Water withdrawal for irrigation has reduced stream flows, increased stream temperatures, and concentrated pollutants. Logging activities have altered stream flows, increased siltation of spawning beds, removed shading and increased stream temperatures, and increased rain-on-snow events causing landslides. Road culverts that are impassible to juvenile and adult anadromous cutthroat significantly reduce the river system's fish-production capabilities by blocking access to spawning and rearing habitat. Diking of the river's shoreline has reduced fish-rearing habitat, streamside vegetation, and altered pools and riffles by confining the river channel.

STOCK DEFINITION PROFILE for Sumas Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Anad Riv Entry								■	■	■			No
Anad Spawning	■	■	■	■									No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Sumas Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Native

Production Type

Wild

Stock Distinction

Distribution

Stock Status

Unknown

Screening Criteria

Harvest Management--There are no net fisheries targeting Sumas coastal cutthroat. Sport-fishing regulations are designed to minimize the impact of recreational fisheries upon cutthroat populations. There is a two-fish daily limit with an eight-inch minimum size limit intended to protect rearing juveniles, outmigrating smolts and resident spawners from harvest.

Hatchery--There are no current releases of hatchery cutthroat in the Sumas drainage. Historically, hatchery cutthroat have been released, but no record exists. Releases of hatchery coho fry have been made in the past, but that no longer occurs. There is no record of hatchery steelhead releases into this watershed.

NORTH PUGET SOUND--NORTH PUGET SOUND TRIBS COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

The North Puget Sound Tribs Stock complex includes stocks in several small independent tributaries which are important cutthroat-producing waters. These tributaries include, from north to south: Dakota, California, Terrell, Squalicum, Padden, Chuckanut, and Oyster creeks. All of these creeks have anadromous and resident forms, both of which are generally considered wild in origin. Adfluvial fish are present in Lake Terrell. Some hatchery cutthroat releases may have occurred in the past, but there is no clear record, and no hatchery releases occur presently. Thus it is assumed that cutthroat in these systems are of native origin with wild production.

In general, the anadromous cutthroat returning to these watersheds are late-entry fish, arriving November through March and spawning January through April. Adfluvial fish in Lake Terrell spawn from January through May. The resident form also begins spawning in January, but continues through July. No genetic sampling has been carried out on any North Puget Sound Tribs stocks.

STOCK STATUS

The status of the North Puget Sound Tribs stock complex is Unknown. Historically, there have been no stock assessment surveys conducted on these systems. Thus information on abundance levels and comparisons of historical to present trends, are not available. Catch information and angler effort are not documented. Spawning location of the anadromous form is the only information that is available.

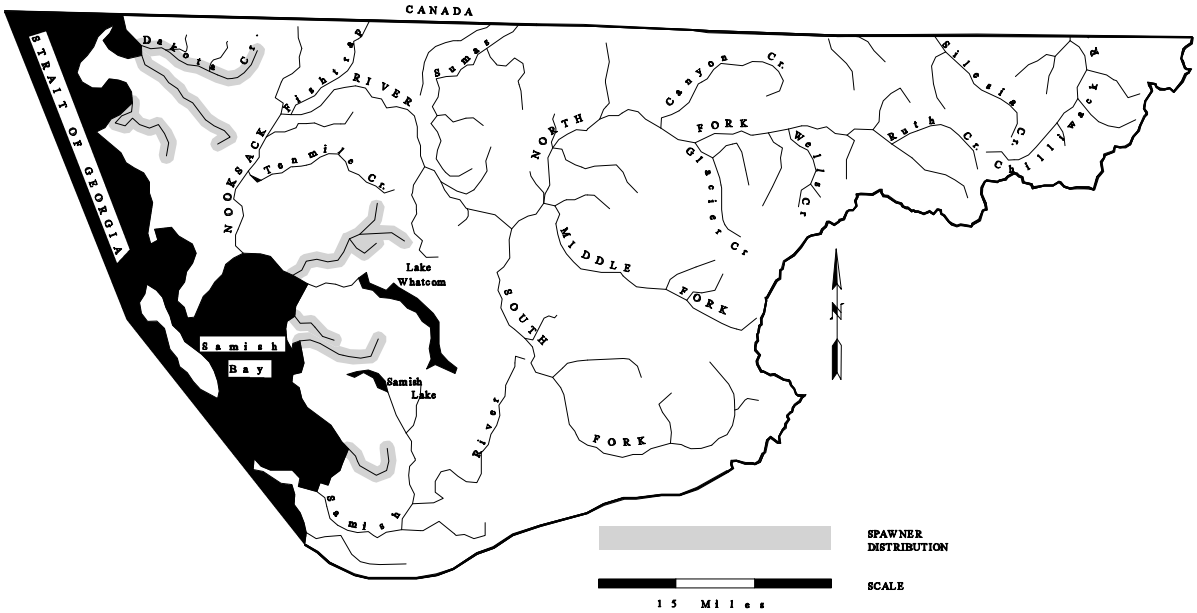
FACTORS AFFECTING PRODUCTION

Habitat--All of these systems have experienced some level of habitat degradation due to human activities such as urbanization, water diversions, diking, pollution discharge, etc. Some such as Squalicum and Padden creeks presently flow through highly developed urban and residential areas, where the streams have been confined and even covered over for much of their lengths. Oil road runoff, septic and drain field failures and other discharges of toxic materials have significantly reduced fish production, to the point that cutthroat trout are now a rarity. California and Dakota Terrell creeks to the north have had fewer impacts, and cutthroat trout are common. Nevertheless, agricultural discharges, diking, road culverts, and siltation have reduced habitat quality there as well. Removal of the forest canopy along most stretches of these creeks has increased water temperatures. To the south, Chuckanut and Oyster creeks still provide fair habitat. However, the creeks are still affected by road building and past and current logging practices that, in some places, have significantly altered the character of the landscape.

STOCK DEFINITION for North Puget Sound Tribs Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Anad Riv Entry	■	■	■								■	■	No
Anad Spawning	■	■	■	■									No
Adfluvial Spawning	■	■	■	■	■								No
Resident Spawning	■	■	■	■	■	■	■	■					No

Adfluvial spawn timing is for Terrell Cr. fish.
Resident spawn timing is for Padden, Chuckanut and Oyster creeks fish.

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for North Puget Sound Tribs Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Native

Production Type

Wild

Stock Distinction

Distribution

Stock Status

Unknown

Screening Criteria

Harvest Management--There are no directed commercial fisheries for cutthroat trout. However, major commercial operations are directed on salmon species in Bellingham/Samish bays at various times August through December. Although anadromous cutthroat may be taken incidental to salmon, we do not believe that the fisheries significantly impact cutthroat populations. Recreational fisheries in these waters are open from June 1 through October 31, with a two-fish daily bag limit and an eight-inch minimum size. There have been no creel surveys estimating catch or effort within any of these waters.

Hatcheries--Hatchery cutthroat trout are not currently released into any of these tributaries. Information regarding historical releases is unclear, but it is believed that if they occurred, they have had little impact on wild populations. More important, in terms of competition and predation on cutthroat juveniles, are coho releases, which do occur in many of these waters.

Dakota Creek: Coho fry releases have been made in the past. No releases have been made in recent years, and future coho releases are uncertain.

California Creek: Coho fry have been released in the past, but no releases are currently planned.

Terrell Creek: Coho fry releases have occurred in the past, but this program has been discontinued.

Squalicum Creek: Coho have been reared and released into this creek (via K-Mart Ponds), but that program has been discontinued. However, 5,000 hatchery coho continue to be reared in net pens in Squalicum Harbor annually.

Padden Creek: Coho fry have been released in the past, but this program has been discontinued.

Chuckanut Creek: Coho fry releases have been discontinued.

Oyster Creek: Presently, there are no coho releases into Oyster Creek.

Hatchery steelhead traditionally are not released into small independent tributaries such as these, but it is possible that releases were made in the past. The only exception is Squalicum Creek where steelhead smolts are transferred to net pens for subsequent release into the drainage.

NORTH PUGET SOUND — NOOKSACK COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

Nooksack coastal cutthroat have been identified as a separate stock complex within the North Sound region based on the geographic distribution of their spawning areas.

All four life history forms (anadromous, fluvial, adfluvial and resident) are present in the Nooksack basin. Anadromous cutthroat occur downstream from Nooksack Falls on the North Fork up to the Middle Fork Bridge on the Middle Fork, and to the RM 31 falls on the South Fork. Most fluvial populations are located upstream of Nooksack Falls on the North Fork and upstream from the Middle Fork Diversion Dam. Adfluvial cutthroat can be found in Maple Creek which flows from Silver Lake on the North Fork. Resident cutthroat exist in many high and low elevation lakes and beaver ponds within the Nooksack watershed as well as in streams.

The anadromous life history form enters the river from salt water from August through October, which is characteristic of early-entry migration timing seen in larger streams. Spawning by anadromous fish takes place from January through April. Fluvial, adfluvial and resident cutthroat spawn from January through July.

Anadromous cutthroat in the Nooksack are native in origin, and production is wild with no hatchery influence. However, resident fish are of mixed native and non-native origin, with historical cutthroat hatchery releases in some of the lakes. Thus, this complex is designated as having composite production. Nooksack cutthroat are represented in the current genetic analysis with a sample originating from Double Ditch Creek. This collection is significantly different from all other Washington collections.

STOCK STATUS

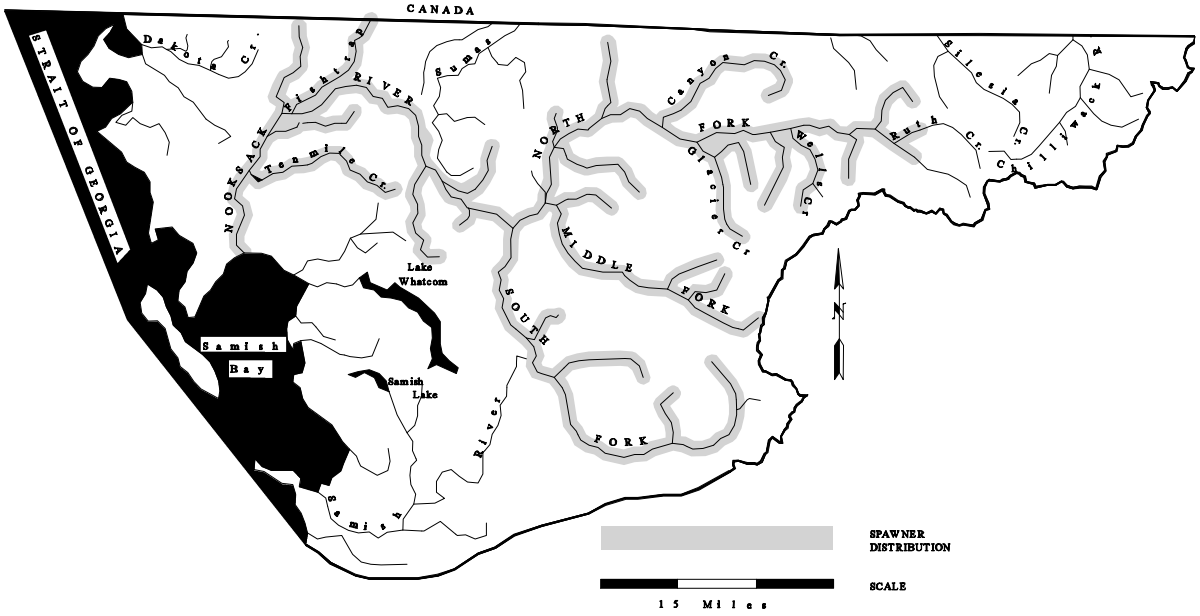
The status of Nooksack coastal cutthroat is Unknown. Biological surveys for coastal cutthroat have concentrated on geographic range and distribution rather than numerical abundance. The quality of data on locations of spawning and rearing sites of anadromous and resident cutthroat throughout the Nooksack and associated lakes is good, but quantitative data on abundance or survival related to stock status are lacking except for some adfluvial populations. These data are insufficient to characterize the status of the entire stock complex.

In most systems the range of anadromous cutthroat has diminished due to reduced water quality and quantity, as well as increased instream and near-stream human-related activities. We do not know if cutthroat abundance has been likewise reduced.

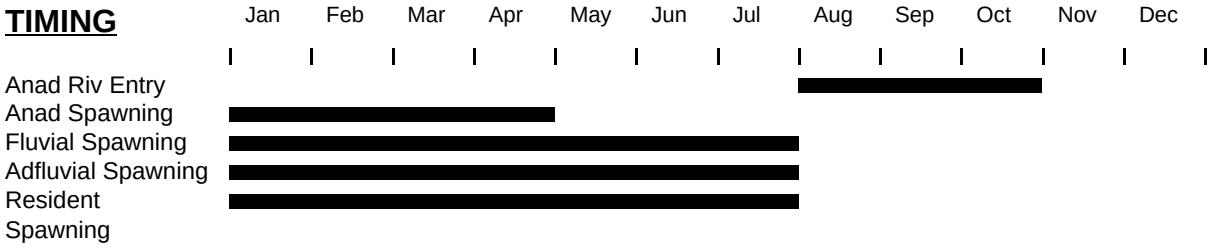
STOCK DEFINITION PROFILE for Nooksack Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



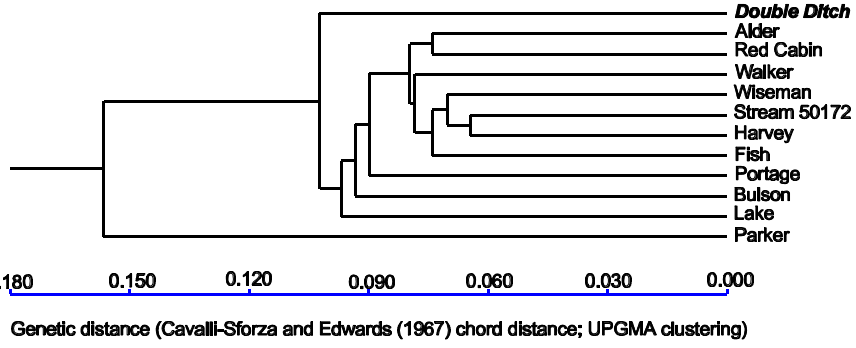
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

GENETICS - The Double Ditch Cr. collection (N=47), made in 1995 was significantly different from all other North Sound collections (33 allozyme-locus G-test; *P*<0.001). A DNA collection from Double Ditch was distinct from a Parker Cr. (Skagit stock complex) (6 microsatellite DNA-locus G-tests; *P*<0.0001).



STOCK STATUS PROFILE for Nooksack Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Mixed

Production Type

Composite

Stock Distinction

Distribution

Stock Status

Unknown

Screening Criteria

FACTORS AFFECTING PRODUCTION

Habitat--In general, livestock grazing and agricultural practices have removed streamside vegetation and increased siltation. Water withdrawals for irrigation has reduced stream flows, increased stream temperatures, concentrated pollutants, and resulted in fish kills. Intense logging has also altered stream flows, silt in spawning beds, removed shading and increased stream temperatures, and increased rain-on-snow events causing landslides. Heavy metals entering the river from the Ferndale sewage treatment plant have been shown by Washington Department of Ecology's live box tests to kill fish, and copper levels are high enough to reduce the activity of the enzyme ATPase activity thereby reducing the ability of smolts to adapt to saltwater. Road culverts that are impassible to juvenile and adult resident and anadromous cutthroat significantly reduce the river system's fish-production capability by blocking access to spawning and rearing habitat.

Harvest Management--The recreational fishery is open from June 1 through March 15. There is a two-fish daily limit with a 14-inch minimum size limit. The size limit is intended to permit most females to spawn at least once.

Hatchery-Presently there are no hatchery releases of cutthroat trout in the Nooksack drainage. Hatchery fish may have been released in the past, but there is no evidence that the native population has been affected. Coho smolts are released annually from Kendall Hatchery (300,000) on the North Fork and from Skookum Hatchery (1.65 million) on the South Fork. Coho fry have also been released into various tributaries, but these fry off-station releases have been reduced significantly in recent years, with the intent to eliminate the program completely. Approximately 1.2 million chinook fingerlings and 500,000 fry were also released from Kendall Hatchery. In addition the Lummi Tribe releases 500,000 fall chinook fingerlings into the lower river. Chambers Creek (South Puget Sound) winter steelhead smolts (30,000) are released into the Middle Fork Nooksack annually. Interactions between hatchery-origin fish and wild Nooksack cutthroat have not been examined, however coho juvenile may compete with cutthroat.

NORTH PUGET SOUND — WHATCOM CREEK COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

Whatcom Creek coastal cutthroat have been identified as a separate stock complex based on the geographic distribution of their spawning grounds. Whatcom Creek is the outlet stream for Lake Whatcom and flows through the city of Bellingham into Bellingham Bay in north Puget Sound.

Anadromous, adfluvial and resident life history forms are present in the Whatcom Creek drainage. Anadromous cutthroat enter the creek from November through March (late-entry migration timing) and spawn from January through April, while adfluvial and resident fish spawn from January through mid-June.

STOCK STATUS

The status of the Whatcom Creek stock is Unknown. Biological surveys dealing with coastal cutthroat have concentrated on geographic range and distribution rather than numerical abundance. The quality of data on locations of spawning and rearing sites of anadromous and resident cutthroat in Whatcom Creek is good. Spawner surveys of resident populations were conducted in several Lake Whatcom tributaries between 1985 and 1994. The quality of these survey data is good, but they are not considered adequate to characterize the status of the entire stock complex. Whatcom Creek cutthroat are not represented in the present genetic analysis.

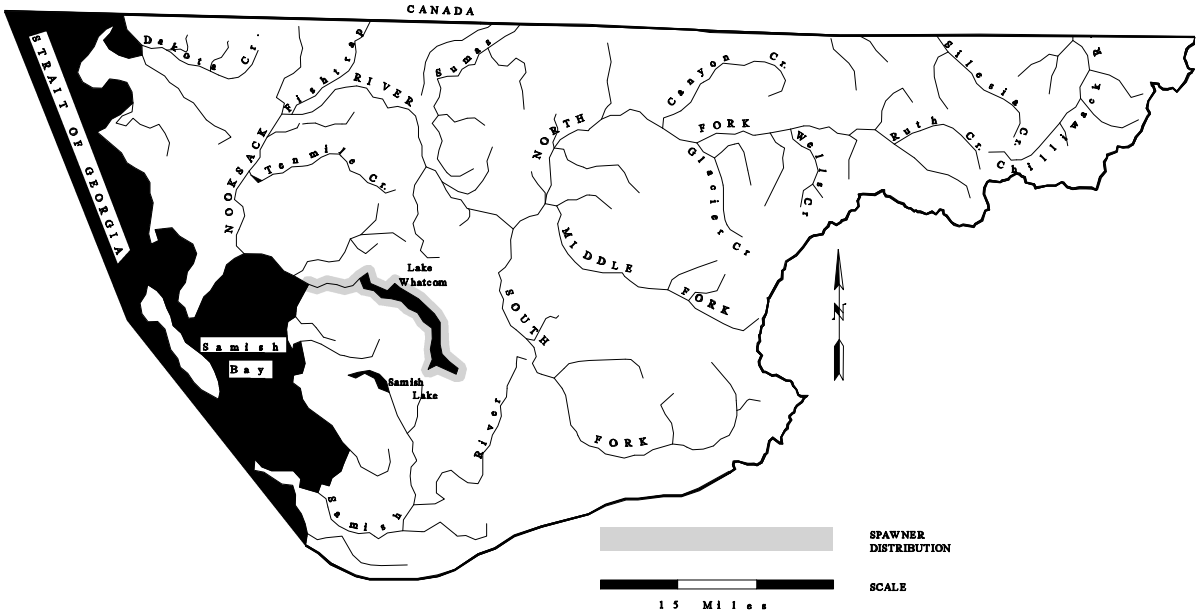
FACTORS AFFECTING PRODUCTION

Habitat--Livestock grazing and agricultural practices that remove streamside vegetation and increase siltation limit spawning areas and fish production in the Lake Whatcom drainage. Logging practices have altered stream flows, increased siltation of spawning beds, removed shading and increased stream temperatures, and increased rain-on-snow events causing landslides. Road culverts that are impassible to juvenile and adult resident and anadromous cutthroat significantly reduce the system's fish-production capability by blocking access to spawning and rearing habitat. Housing developments and road building in the system have altered streams, reduced water quality, and silted stream beds to the point that only Cemetary Creek and lower Lincoln Creek now provide spawning habitat for sea-run cutthroat. Most streams entering the northwest one-third of Lake Whatcom no longer support significant numbers of cutthroat spawners. Sewage spills from the Sudden Valley sewer line along Lake Whatcom Boulevard have degraded water quality, as has street run-off throughout the system.

STOCK DEFINITION PROFILE for Whatcom Creek Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Anad Riv Entry	■	■	■								■	■	No
Anad Spawning	■	■	■	■									No
Adluvial Spawning	■	■	■	■	■	■							No
Resident Spawning	■	■	■	■	■	■							No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Whatcom Creek Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Native

Production Type

Wild

Stock Distinction

Distribution

Stock Status

Unknown

Screening Criteria

Harvest Management--The recreational fishery is open from June 1 through February 28. There is a two-fish daily limit with a 14-inch minimum size limit intended to protect first-time spawners and some repeat spawners from harvest.

Hatchery--Lake Whatcom cutthroat trout were used at one time for a broodstock program at Tokul Creek (Snohomish River system) (Crawford 1979). However, there are no hatchery cutthroat releases into Lake Whatcom. Coho releases have been discontinued. Hatchery winter steelhead of Chambers Creek (South Puget Sound) origin are released annually into Whatcom Creek, with recent release numbers of 5,000 smolts per year. Interactions between hatchery-origin fish and Lake Whatcom cutthroat have not been examined, however hatchery fish may compete with wild cutthroat.

NORTH PUGET SOUND — SAMISH COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

Samish coastal cutthroat have been identified as a separate stock complex based on the geographic distribution of their spawning grounds.

Anadromous and resident life history forms are present in the Samish River drainage. Adfluvial forms are also thought to exist in the system, using Samish Lake for adult habitat. Anadromous cutthroat enter the river from August through October (early-entry migration timing) and spawn from January through April, while adfluvial and resident fish spawn from January through May. Samish cutthroat are considered to be native, and are maintained through wild production.

No genetic sampling of coastal cutthroat within the Samish basin has been conducted.

STOCK STATUS

The status of Samish coastal cutthroat is Unknown. Biological surveys for coastal cutthroat have concentrated on geographic range and distribution rather than numerical abundance. The quality of data on locations of spawning and rearing sites of anadromous and resident cutthroat in the Samish River is good. Quantitative data related to stock status are lacking, except for sporadic trap data from the Samish Hatchery and some life history and creel survey/hooking mortality data collected in the mid-1980s. However, these data are not considered adequate to determine current status.

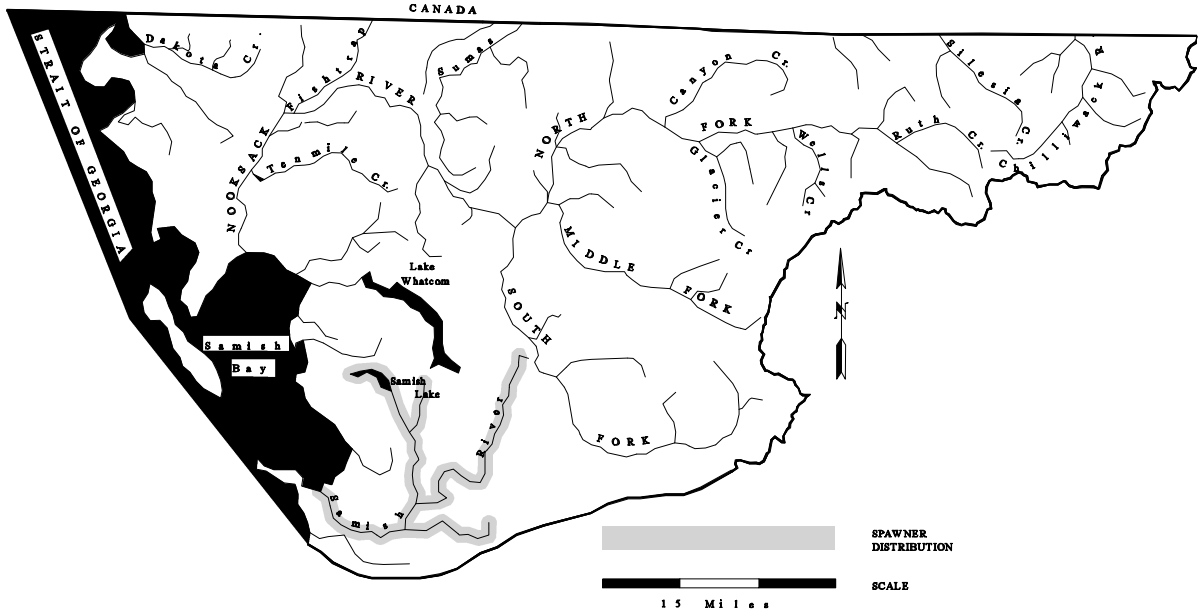
FACTORS AFFECTING PRODUCTION

Habitat--Livestock grazing and agricultural practices that remove streamside vegetation and increase siltation limit spawning areas and production. Water withdrawals for irrigation have reduced stream flows, increased stream temperatures, concentrated pollutants and resulted in fish kills. Logging practices have also altered stream flows, increased siltation of spawning beds, removed shading and increased stream temperatures, and increased rain-on-snow events causing landslides. Road culverts that are impassible to juvenile and adult anadromous cutthroat significantly reduce the river system's fish production capability by blocking access to spawning and rearing habitat. Diking of the river's shoreline has reduced fish-rearing habitat, streamside vegetation, and altered pools and riffles by confining the river channel.

STOCK DEFINITION PROFILE for Samish Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Anad Riv Entry								■	■	■			No
Anad Spawning	■	■	■	■	■								No
Adfluvial Spawning	■	■	■	■	■	■							No
Resident Spawning	■	■	■	■	■	■							No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Samish Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Native

Production Type

Wild

Stock Distinction

Distribution

Stock Status

Unknown

Screening Criteria

Harvest Management--The recreational fishery is open from June 1 through March 15. There is a two-fish daily limit with a 14-inch minimum size limit intended to protect rearing juveniles, outmigrating smolts, first-time anadromous spawners and some repeat spawners from harvest.

Hatchery--There are no known releases of hatchery cutthroat into the Samish River. At one time coho were released into Samish River. However, that program was discontinued in the early 1980's, and presently the river is managed for wild coho. Steelhead are released into the Samish River with a current annual planting goal of 30,000 smolts. Samish Hatchery releases 100,000 yearling fall chinook smolts and 5.2 million fall chinook fingerling smolts in the Samish River annually. Interactions between hatchery-origin fish and Samish cutthroat have not been examined, however hatchery-origin steelhead juveniles may compete with wild cutthroat.

SKAGIT — SKAGIT COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

Skagit coastal cuthhroat have been identified as a separate stock complex based on the geographic distribution of their spawning grounds. The Skagit River basin is the largest watershed within Puget Sound, and includes such major tributaries as the Sauk, Suiattle, Cascade, and Baker rivers and incorporates numerous habitat types, from fast water, cascading watercourses to slow lowland streams. All life-history forms of cutthroat are found within the system. The anadromous form is found in most mainstem and some tributary waters where passage to salt water is accessible. The adfluvial form can be found in waters of Baker Lake and Lake Shannon, as well as Ross Lake and its tributaries. Stream population work done by WDG in 1977 and 1978 showed that anadromous cutthroat fry were most numerous in the lower tributaries of the Sauk River and north bank tributaries below the Sauk. This distribution also is consistent with angler data, where most cutthroat were caught below the mouth of the Sauk. All forms are considered native in origin, and production is wild.

The anadromous form is an early-entry type, entering the mouth of Skagit River from July through November. Spawning occurs from January through April. Adfluvial fish spawn from June to mid-August while resident fish spawn from January though May. Little is know about the saltwater movements of the anadromous form, but it is believed that they are distributed in Skagit Bay, along the shores of Camano and Hope islands and in Swinomish Slough.

Genetically, Skagit cutthroat are represented by collections from a number of tributaries, including Alder, Red Cabin, Walker, Wiseman, Bulson, Lake and Parker creeks. Each of these collections is genetically distinct from the others and from all other Washington cutthroat collections.

STOCK STATUS

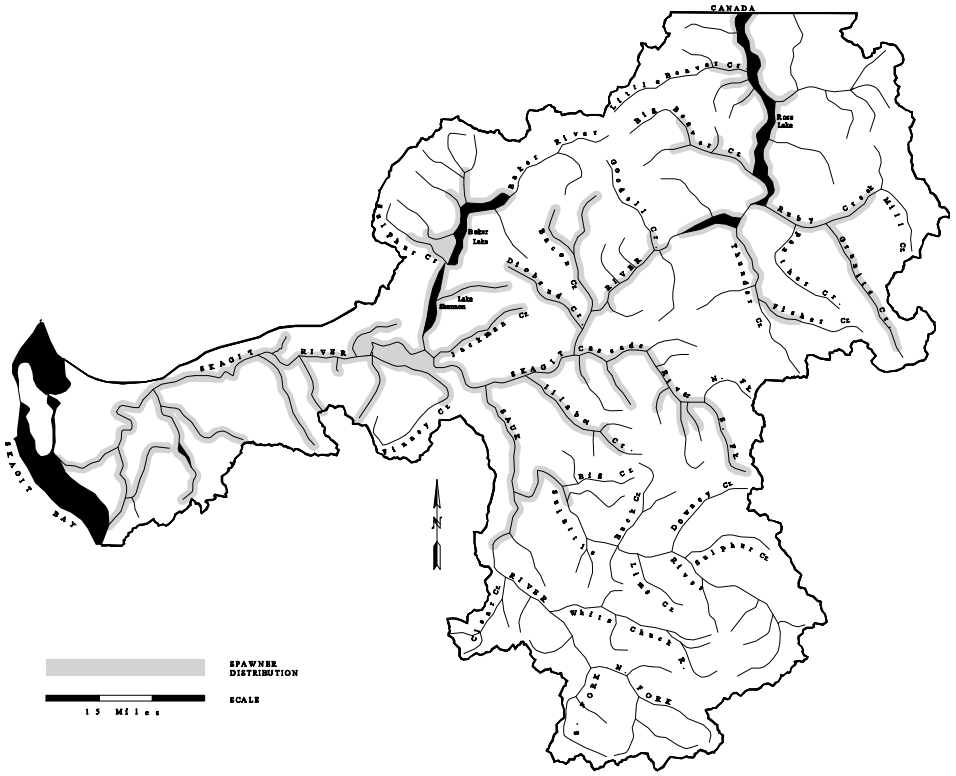
The status of Skagit coastal cutthroat is Unknown. DeShazo (1980) presented data indicating a declining catch of anadromous cutthroat, at least from 1954 through 1976. During the earlier part of this period, average catch per angler for five out of six years was greater than 0.65, while during the latter years it had dropped below 0.5 fish per angler. However, it is uncertain that these data are related to actual abundance. The size of the fish caught was reported to range from ten to twenty-two inches.

A juvenile abundance study was conducted 1977 through 1979 on 14 Skagit tributaries (Freymond 1980). Index areas were electroshocked to obtain densities of coho and steelhead, but cutthroat trout were also recorded. For one-year-old fish and older, the

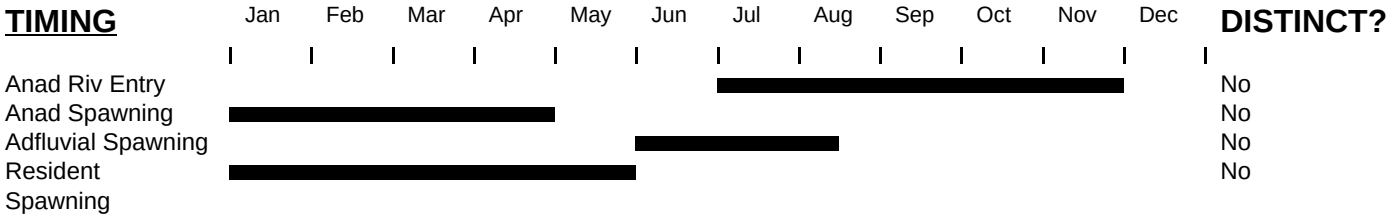
STOCK DEFINITION PROFILE for Skagit Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



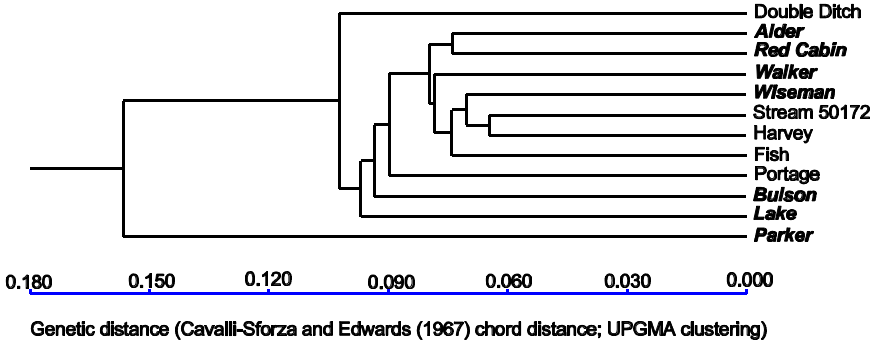
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

GENETICS - Collections from Parker Cr. (N=50), Red Cabin Cr. (N=50), Lake Cr. (N=50), Bulson Cr. (N=48), Walker Cr. (N=50), Wiseman Cr. (N=51) and Alder Cr. (N=57) made in 1995 were significantly different from one another and from other North Puget Sound collections (33 allozyme locus G-tests; *P*<0.001). A DNA collection from Parker Cr. was significantly different from the Double Ditch Cr. (Nooksack) collection (6 microsatellite DNA-locus G-tests; *P*<0.0001).

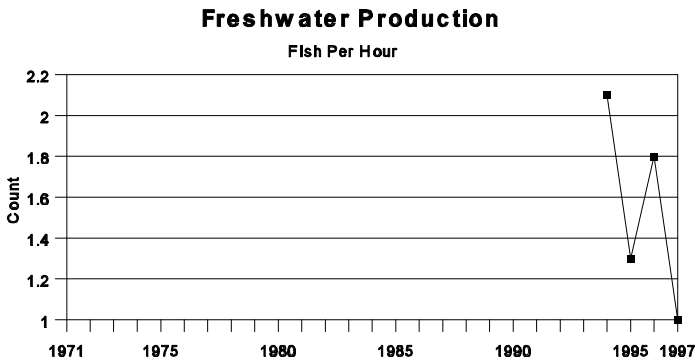


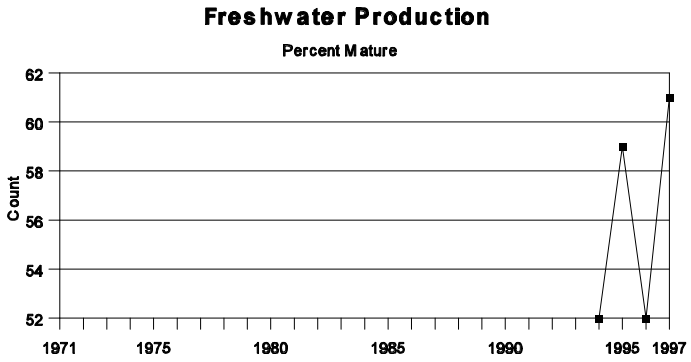
STOCK STATUS PROFILE for Skagit Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD Fish/Hr	FW PROD % Mature	FW PROD % Respawn	FW PROD Mat Respawn
1971				
1972				
1973				
1974				
1975				
1976				
1977				
1978				
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994	2	52	13	25
1995	1	59	27	47
1996	2	52	17	33
1997	1	61	15	25





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Native

Production Type

Wild

Stock Distinction

Distribution

Stock Status

Unknown

Screening Criteria

average densities for all sample sites for each year were: 1977--0.07/m^2 , 1978--0.05/m^2, 1979--0.07/m^2.

FACTORS AFFECTING PRODUCTION

Habitat--Many Skagit tributaries flow through private timber lands. Thus much of the watershed has been extensively harvested. Earlier logging operations did considerable damage to the watershed, and ultimately to the fish resources. Recent Washington Forest Practices Rules upgrades have helped, but watershed destruction remains a major factor affecting fish production. In addition, culverts, dams, water diversion, urban development, agriculture and diking have all taken their toll on cutthroat production. It is expected that habitat degradation will continue in the future, especially given the increased urbanization that presently occurs throughout Puget Sound.

Harvest Management--Commercial fisheries directed on salmon occur in marine areas and within the mainstem waters. Although these fisheries do occasionally take anadromous cutthroat, they are not thought to be significant sources of cutthroat mortality. The daily sport-fishing limit is two fish with a minimum size limit of 14 inches for mainstem waters. In tributaries there is a two-fish daily limit with an eight-inch minimum size limit intended to protect juveniles and resident fish.

Hatcheries--Although there are no recorded hatchery releases of coastal cutthroat in the Skagit system, it is possible that sporadic, small releases have occurred from time to time. Nevertheless, we believe that there have been no effects of cultured fish on anadromous cutthroat. But given the large scale of the past hatchery program, it is possible that the other forms, particularly resident cutthroat, have been influenced by hatchery-origin fish. The Skagit is managed primarily for wild stocks of other salmonid species, which means that hatchery production is focused on rebuilding and mitigation programs, and we believe that these programs have not resulted in decreased cutthroat production. Major releases of hatchery steelhead smolts do occur on an annual basis. The present annual release goal is 534,000 smolts into the Skagit basin.

STILLAGUAMISH — STILLAGUAMISH COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

The Stillaguamish coastal cutthroat stock complex has been identified as distinct based on the geographic distribution of its spawners. Coastal cutthroat are found throughout the lower and middle reaches of the Stillaguamish basin, in nearly all of the perennial, and some of the intermittent tributaries of the mainstem and in the North Fork and South Fork.

The cutthroat in the basin are a mixture of life-history forms, and the interactions among them can be complex, perhaps creating multiple stocks. Genetic sampling was conducted in the 1970s and was repeated in 1995 with samples from Portage, Fish, Harvey creeks and unnamed Stream 50172. The Harvey Creek and Stream 50172 collections were not significantly different from one another. The other collections were different from one another and from other North Sound cutthroat collections.

The majority of cutthroat in the basin are anadromous. Major producers of anadromous cutthroat on the mainstem are the Church Creek basin, Pilchuck Creek up to RM 10 and its tributaries, the Portage Creek basin, and Armstrong Creek/Harvey Creek basin. Anadromous fish are found in all the small tributaries of the North Fork up to the barrier falls at RM 35.5 and including Brown's Creek in the Squire Creek drainage and in Jim Creek and lower Canyon Creek in the South Fork. River entry from salt water is from mid-July through October (early-entry migration timing). Anadromous spawning takes place from mid-February through May.

Adfluvial coastal cutthroat are found in several lakes in the basin. The more important of these include Cavanaugh, Upper and Lower Twin Lakes in the Jim Creek drainage, Trout Lake in the Canyon Creek drainage, and Riley Lake. Adfluvial spawning is from January through June.

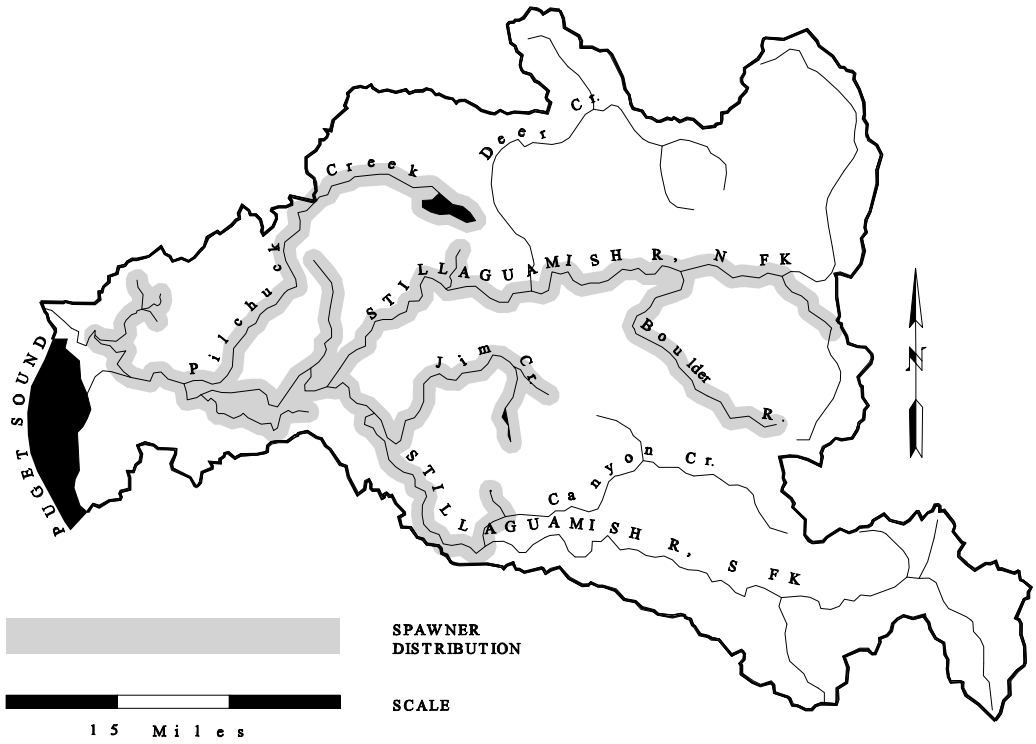
The resident form is found co-mingled with the anadromous form in the headwater areas of the anadromous reaches. Only resident fish are found above anadromous barriers. Few resident coastal cutthroat are found above Granite Falls on the South Fork and the falls at RM 35.5 on the North Fork. Resident cutthroat are also found in a number of beaver ponds in the area. Resident spawning occurs from January through June.

Overall, stock origin is mixed, and production type is wild. The anadromous fish are considered native. There were limited releases of anadromous cutthroat in the late 1960s, and a native brood stock program was established in the early 1980s. The resident fish are considered to be a mixture of native and introduced fish. Many of the

STOCK DEFINITION PROFILE for Stillaguamish Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



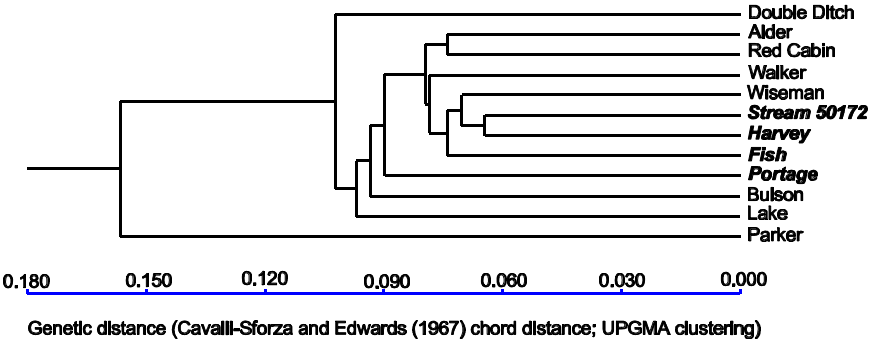
TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Anad Riv Entry							■	■	■	■			No
Anad Spawning		■	■	■	■	■							No
Adfluvial Spawning	■	■	■	■	■	■							No
Resident	■	■	■	■	■	■							No
Spawning													

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

GENETICS - Collections from Portage Cr. (N=52), Fish Cr. (N=52) made in 1995 were significantly different from each other, from the Harvey Cr. (N=75) and Stream 50172 (N=50) collections and from other North Sound Collections (33 allozyme-locus G-tests; *P*<0.001). Harvey Cr. and Stream 50172 were not significantly different from one another (33 allozyme-locus G-Tests; *P*>0.05).

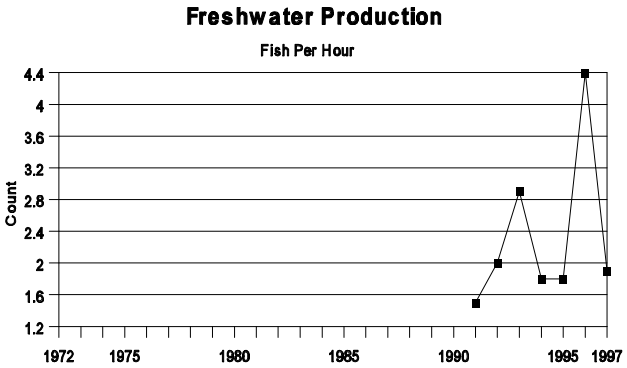


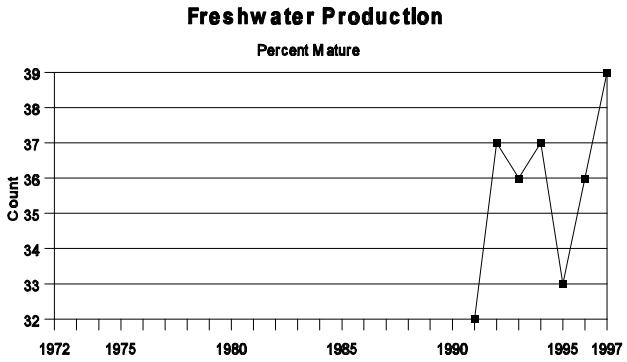
STOCK STATUS PROFILE for Stillaguamish Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD Fish/Hr	FW PROD % Mature	FW PROD % Respawn	FW PROD Mat Respawn
1972				
1973				
1974				
1975				
1976				
1977				
1978				
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991	2	32	4	12
1992	2	37	5	12
1993	3	36	3	8
1994	2	37	5	15
1995	2	33	2	7
1996	4	36	3	7
1997	2	39	2	5





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Mixed

Production Type

Wild

Stock Distinction

Distribution

Stock Status

Healthy

Screening Criteria

small-stream resident populations are native while most of the other resident fish have been influenced by hatchery releases into alpine lakes, lowland lakes, and/or beaver ponds. The adfluvial populations are introduced with some potential natural influence. Most lakes in the basin were treated with rotenone at least once in the past 50 years to eliminate species which compete with trout. Native adfluvial cutthroat were largely replaced with non-local cutthroat. Some contributions from native fish may have been possible from resident populations in upstream tributaries or from anadromous fish migrating into streams flowing into or out of treated lakes.

STOCK STATUS

The status of Stillaguamish coastal cutthroat is believed to be Healthy.

For the anadromous life history form, this determination is based on several factors. Length frequency and sexual maturity information collected through hook and line sampling the last five years in the mainstem Stillaguamish seems to indicate a stable population. About one-third of the fish caught in the mainstem in September and October are mature with a fairly constant portion of repeat spawners in the population. The catch per hour during this sampling varied between 1.5 and 2.9 fish per hour with an average of two fish per hour. In the 1960s and 1970s, angler creel checks were conducted on the Stillaguamish mainstem as well as the North Fork. Catch per angler/per day ranged from 0.07 to 0.85, with an average of about 0.4 (DeShazo 1980). It is uncertain how meaningful this information is in terms of cutthroat abundance, but it does offer some value ranges that could provide future comparisons.

A smolt trap installed and operated by the Tulalip Tribe on lower Church Creek in the late 1980s caught 1,800 to 3,000 cutthroats a year with an average of more than 2,000 smolts a year. The Church Creek basin represents about eight percent of the linear miles available to cutthroat in the basin. This would imply a basin smolt of production of about 25,000, assuming similar habitat quality. Church Creek has been impacted by low flows and development more than other drainages in the Stillaguamish basin. Although the current estimated production level is considered healthy, no comparisons can be made to historical abundance levels, which could have been significantly higher.

The status of fluvial, adfluvial and resident fish is Unknown due to lack of quantitative trend data but is believed to be Healthy. Electofishing sampling by local WDFW field staff found abundant cutthroat parr in all habitats expected to contain cutthroat. Habitat biologists sampling the upper portion of the various watersheds for the presence of fish find cutthroat in most areas. Abundant densities of fish in expected habitats as well as presence in the upper fringe areas are indicators of a healthy population.

The quality of these data is fair for anadromous fish and poor for fluvial, adfluvial and resident fish.

FACTORS AFFECTING PRODUCTION

Habitat--In-stream juvenile rearing is limited for all life history forms by summer low flows. Agricultural, residential, and forestry have contributed to poor water quality in the lower river and many of the tributaries, limiting the success of spawning adults and the rearing of juveniles. The anadromous life-history form is limited by the loss of 90 percent of the lower estuary and associated wetlands and by high stream temperatures during the summer in the lower river.

Harvest Management--Stillaguamish anadromous cutthroat have been under conservative management since 1980. In that year the daily limit was reduced to two fish with a 10-inch minimum size limit intended to protect rearing juveniles, outmigrating smolts, first-time anadromous spawners and some repeat spawners from harvest. As more conservative stream management strategy was developed, the regulations on the Stillaguamish were upgraded to those standards. The minimum size limit is now 14 inches. Upper tributaries are governed under statewide regulations with the season running from June 1 through October 31, eight-inch minimum, and two-fish daily bag limit.

The present management of the anadromous and resident life history forms is intended to encourage adequate recruitment of juvenile cutthroat. Potential problems may arise as current harvest practices may not provide for maintenance of older, larger multiple-spawning adults, especially in face of high fishing effort. Also, in areas of high fishing effort, hooking mortality of sublegal-size fish may become a limiting factor. Current harvest management of the adfluvial life history form does not guarantee recruitment of juvenile fish, and wild production may limit current populations.

There is some potential for incidental harvest of cutthroat stocks in fisheries for other species such as salmon, but there is no evidence that it has significantly impacted the cutthroat population.

Hatchery--No hatchery cutthroat are released into this system. Currently the Washington Department of Fish and Wildlife releases approximately 170,000 winter steelhead smolts in the anadromous mainstem areas of the North Fork and South Fork Stillaguamish annually. They also release rainbow trout in some of the lowland and alpine lakes. The Stillaguamish Tribe rears and releases summer chinook, coho and chum salmon in the basin. Releases of salmon presmolts in cutthroat juvenile-rearing areas could be a concern, as are releases of rainbow trout or other exotic game fish (often illegally) into the lakes supporting adfluvial cutthroat populations. Conflicts can arise through competition for food or incidental harvests.

SNOHOMISH — SNOHOMISH COASTAL CUTTHROAT

STOCK DEFINITION AND ORIGIN

The Snohomish coastal cutthroat stock complex has been identified as distinct based on the geographic distribution of its spawning grounds. Coastal cutthroat are found throughout the various reaches of the Snohomish basin including the mainstem Snohomish, Snoqualmie, and Skykomish rivers and nearly all of their tributaries.

All life-history forms (anadromous, fluvial, adfluvial and resident) are present in the Snohomish basin. The anadromous life-history form is found in most perennial streams and in some intermittent streams throughout the anadromous reaches of the system. In the Snohomish, the major anadromous cutthroat producers are Quilceda Creek and the Pilchuck River basin up to and including Worthy Creek. Nearly all of the anadromous cutthroat in the Skykomish portion of the basin are found downstream from the town of Goldbar. Major Skykomish cutthroat producers are Woods Creek and the Wallace River drainage.

Anadromous cutthroat are found in nearly all the tributaries of the Snoqualmie River to Snoqualmie Falls. Major Snoqualmie producers include Cherry Creek, Stossel Creek and Raging River. River entry is from July through October (early-entry timing), and anadromous spawning is from early February through May.

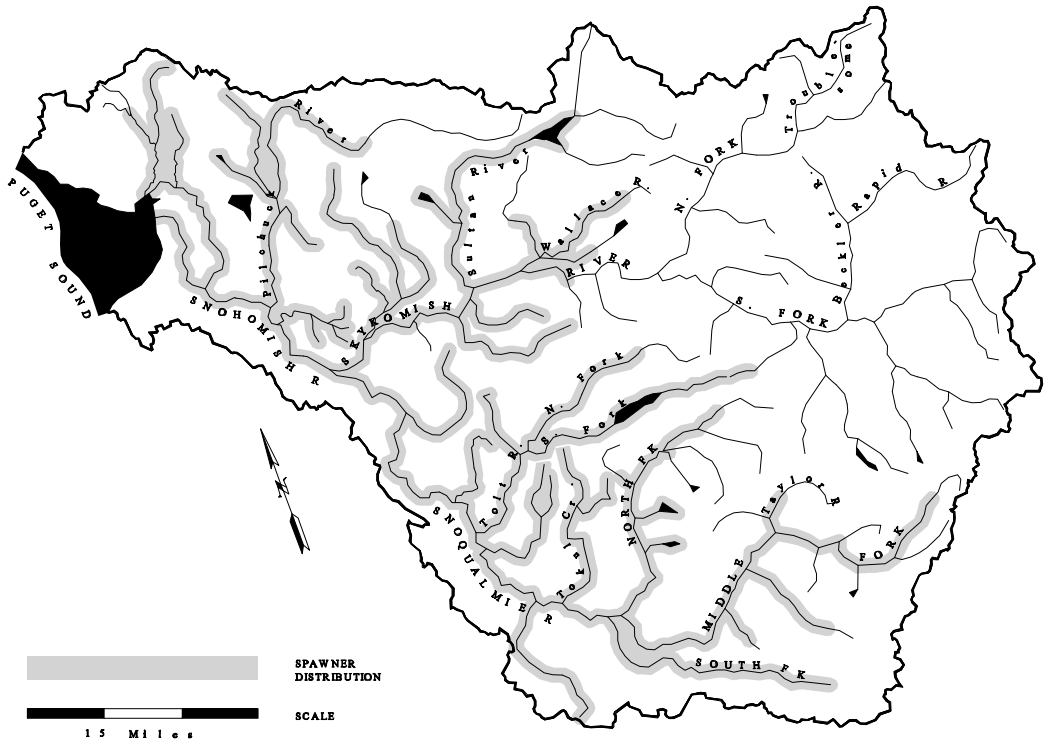
The fluvial life history form is found in the larger rivers above the anadromous reaches. There are limited numbers of fluvial cutthroat in the Snohomish and Skykomish portions of the basin but large numbers in the Snoqualmie portion. In the forks of the Snoqualmie, (Middle, North and South forks) and the upper forks of the Tolt, there are nearly 100 miles of stream supporting fluvial cutthroat. Some fluvial cutthroat may also be found in other scattered areas of the basin. Fluvial spawning occurs from January through mid-June. In some areas of the basin there has been an extensive history of hatchery cutthroat stocking in waters containing fluvial populations (e.g., South Fork Snoqualmie). In other areas there has been little or no stocking (e.g., upper South Fork Tolt). Consequently there are stream reaches with native fluvial populations while others have non-native fish or mixtures of native and non-native fish. Production today is strictly of wild origin.

The adfluvial life history form is found in a number of lakes within the Snohomish basin. They are found in two reservoirs, the South Fork Tolt Water Supply Reservoir and Spada Lake on the Sultan River. They are also found in a number of lowland lakes including Bridges, Boyle, Klaus, Flowing, Storm, Panther and Stevens lakes and in a number of small ponds and sloughs as well as in some alpine or near-alpine lakes (e.g., Hancock and Calligan lakes). Spawning is from January through mid-June.

STOCK DEFINITION PROFILE for Snohomish Coastal Cutthroat

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Anad Riv Entry							■	■	■	■			No
Anad Spawning		■	■	■	■	■							No
Fluvial Spawning	■	■	■	■	■	■							No
Adfluvial Spawning	■	■	■	■	■	■							No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Snohomish Coastal Cutthroat

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD Fish/Hr	FW PROD % Mature	FW PROD % Respawn	FW PROD Mat Respawn
1971				
1972				
1973				
1974				
1975				
1976				
1977				
1978				
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996	2.8	4.2	5.2	12.4
1997	3.2	4.3	5.6	8.2

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin

Mixed

Production Type

Wild

Stock Distinction

Distribution

Stock Status

Unknown

Screening Criteria

The small-sized resident life history forms are found throughout the basin generally occupying the smaller streams often found in conjunction with one or more of the other three larger life history forms. Many of the resident populations are native though some may reflect the stocking history of the fluvial or adfluvial fish where they co-mingle with those life history forms. Because many of the beaver ponds are small in size, we believe that cutthroat inhabiting these areas are most likely resident fish, although the presence of adfluvial, fluvial or anadromous fish is also possible.

No cutthroat genetic samples were collected from this system.

STOCK STATUS

The status of the Snohomish stock complex is Unknown but may be Healthy. There is little quantitative information on abundance or survival for determination of stock status for any life history form of coastal cutthroat in the Snohomish River basin. Angler creel checks have been conducted in the past, but they offer little information regarding abundance. Likewise, electroshocking has also been conducted on various tributaries, but at best, provides only presence/absence information (DeShazo, 1980). (See DeShazo also for specific information on creel check locations and catches.)

For anadromous cutthroat, available data include some information from coho smolt traps and electrofishing information. These data are more useful in providing information on distribution of fish in the basin than on stock status. Good data on distribution, abundance, growth and age at sexual maturity are available from the forks of the Snoqualmie River and the North Fork Tolt River. There is limited creel survey information from Spada Lake, age and sexual maturity information for fish in other lakes, and some spawning-ground survey data. The quality of the Spada Lake data is good. Information on resident fish is primarily presence and absence information.

FACTORS AFFECTING PRODUCTION

Habitat--In-stream juvenile rearing is limited for all life history forms by summer low flows. Agricultural, residential, and forestry land uses have contributed to poor water quality in the larger rivers and many of the tributaries limiting the success of spawning adults and the rearing of juveniles of all life forms. The loss of wetlands and near-estuarine habitat may be limiting anadromous production. The introduction of exotic or non-native fish species in the lake environments is limiting the production of adfluvial populations. Nearly all cutthroat areas are experiencing problems from the growing human populations in the area. Increased development has degraded water quality in small streams, where the majority of production occurs. Increased development has also resulted in stream modifications, such as diking and channeling. All of this has effectively reduced available and usable habitat for cutthroat.

Harvest Management--Anadromous, fluvial and resident fish are managed to allow most females to spawn at least once before reaching the legal minimum size. Current angling regulations in the Snohomish River call for a two-fish daily limit with a 14-inch minimum size limit in the marine waters and the larger mainstem freshwater areas to protect first-time anadromous spawners and some repeat spawners. The smaller spawning and rearing streams are closed during the spawning season and have a two-fish daily limit and an eight-inch minimum size limit during the summer to protect juveniles, outmigrating smolts and resident spawners.

The Snoqualmie River above Snoqualmie Falls and its north and south forks and South Fork Tolt above the dam have a two-fish daily limit with a ten-inch minimum size limit to protect fluvial females. The Middle Fork Snoqualmie and the North Fork Tolt above Yellow Creek are catch-and-release only areas.

Current management of adfluvial populations varies from lake to lake. Adfluvial populations are generally managed with no minimum size limit and a five-fish daily limit. The lack of a minimum size limit means that females are not protected from harvest prior to spawning at least once. This regulation may not provide for recruitment of juvenile fish. However, a number of waters with significant cutthroat populations (Bridges, Boyles, and Klaus lakes and South Fork Tolt Reservoir and others) are managed under the Stream Management concept, populations are protected with a two-fish daily limit and a 14-inch minimum size limit. In Spada Lake there is a five-fish daily limit and a 12-inch minimum size limit.

Potential future problems may arise as current harvest practices may not provide for maintenance of older multiple-spawning adults, especially in face of high fishing effort. Also in areas of high fishing effort, hooking-mortality of sublegally-sized fish may become a limiting factor. In addition, there is potential for some incidental harvest of cutthroat in salmon fisheries.

Hatchery--Currently the Washington Department of Fish and Wildlife releases steelhead smolts as well as chinook and coho smolts in the anadromous portion of the basin. They also release rainbow trout in some beaver ponds as well as in some lowland and alpine lakes. Releases of pre-smolts in cutthroat juvenile rearing areas could be a concern. The introduction of exotic or non-native fish species into lakes is limiting the production of adfluvial cutthroat.

The releases of rainbow trout or other game fish into the lakes supporting adfluvial cutthroat populations or beaver ponds containing resident cutthroat could also impact cutthroat through competition for food or incidental harvests.